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Financial Transaction Taxes: International Experiences, Issues and Feasibility

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- The financial transaction tax (FTT) is a policy idea with a long history that, in the wake of the global financial crisis, has attracted renewed interest in some quarters.
- Historically, there have been two motivating factors for the introduction of the tax. The first is its potential to raise substantial revenues, and the second is its perceived potential to discourage speculative trading and reduce volatility.
- There is, however, little empirical evidence that an FTT reduces volatility. Numerous studies suggest that an FTT harms market quality and is associated with an increase in volatility and a decrease in both market liquidity and trading volume. When the cost of acquiring a security rises, its required rate of return and cost of capital also increase. As a result, an FTT may reduce the flow of profitable projects, decreasing levels of real production, expansion, capital investment and even employment.
- There are many unanswered questions regarding the design of FTTs and their ability to raise significant revenues.

Robust financial markets are crucial to a well-functioning financial system, and several proposals designed to improve the operation of financial markets have been motivated, at least in part, by the recent financial crisis. One of these proposals is to tax financial transactions, and several jurisdictions, notably in Europe, are currently studying the idea. In 2011, the European Union (EU) proposed an EU-wide financial transaction tax (FTT) on the exchange of shares and bonds at a rate of 0.1 per cent and on derivatives contracts at a rate of 0.01 per cent.[1] While there has been significant resistance from some EU member states, FTTs are popular and have enthusiastic supporters. France, for example, has introduced a 0.2 per cent transaction tax that took effect on 1 August 2012.[2]

One of the stated goals of an FTT is to raise substantial revenues. The European Commission, for example, has estimated that its proposed FTT could raise €57 billion annually. In addition, proponents of FTTs argue that, unlike most taxes, an FTT would benefit financial markets by curtailing

1 Primary markets for stocks and bonds, as well as financial transactions with central banks, would be excluded from the FTT. See the full proposal at <http://ec.europa.eu/taxation_customs/taxation/other_taxes/financial_sector/index_en.htm>.

2 The French government doubled the levy to 0.2 per cent from the 0.1 per cent initially advocated. The tax will be paid on the purchase of 109 French stocks with market values of more than €1 billion.

short-term speculative trading and thus reducing volatility. However, empirical studies of situations where transaction taxes have been implemented show that these taxes have generated a number of unintended consequences, such as increased volatility, wider bid-ask spreads, greater price impact[3] and decreased trading volume. Determining whether there are net benefits to an FTT relies on an assessment of its effect on market quality and on its ability to raise the intended revenues. This article examines these two forces and highlights the challenges in implementing an FTT.

Empirical studies show that transaction taxes have generated a number of unintended consequences, such as increased volatility, wider bid-ask spreads, greater price impact and decreased trading volume

The Effect of a Financial Transaction Tax on Market Quality

Since a deterioration of market quality has implications for the stability and robustness of a market, this section examines evidence of the effect of an FTT on four specific measures of market quality: volatility, volume, liquidity and the cost of capital.

Volatility

Various economists have argued that an increase in the cost of trading will reduce the amount of disruptive speculation, thereby decreasing *excess* volatility. Keynes (1936), Tobin (1978), Stiglitz (1989), and Summers and Summers (1989) all theorize that certain traders—often labelled "noise traders"—do not make trades based on information about the fundamental value of a security, causing security prices to move away from their intrinsic values. This price movement would, in turn, reduce the quality of the information contained in market prices and create excess volatility in the market. By imposing an FTT and discouraging the activity of noise traders, prices would stabilize and volatility would decline.

The argument that noise traders introduce excess volatility has been criticized on many fronts, since it is unclear what excess volatility is, given the difficulty in defining and measuring an *optimal* level of volatility. In addition, because an FTT applies to all trading activity and not only speculative trading, it may reduce other types of trading activity. Some researchers have suggested that an FTT may have a greater effect on the activities of those traders who stabilize prices and do not introduce noise, such as informed traders and liquidity providers. Amihud and Mendelson (2003), for example, suggest that an FTT would reduce the amount of informed trading, which would widen the gap between an asset's transaction price and its fundamental value, which, in turn, may increase volatility.

The argument that noise traders introduce excess volatility has been criticized on many fronts, since it is unclear what excess volatility is, given the difficulty in defining and measuring an optimal level of volatility

Given the lack of consensus in the theoretical literature on an FTT's impact on volatility, there have been numerous attempts to resolve the debate empirically.[4] The findings of these studies can be grouped according to three divergent results: a positive relationship, an inverse relationship and no effect.[5]

The first group of studies finds a positive relationship between an FTT and volatility (Umlauf 1993; Jones and Seguin 1997; Baltagi, Li and Li 2006; Pomeranets and Weaver 2011). Pomeranets and Weaver (2011), for example, examine nine changes in the level of an FTT levied on equity transactions in the state of New York and conclude that an increase in the FTT is related

3 Price impact is the degree to which a price moves in response to a given trading volume.

4 Generally, the volatility discussed in this article is measured as the standard deviation of returns.

5 Empirical studies face three challenges. It is difficult to: (i) differentiate between the impact of an FTT and changes to market structure and policy changes; (ii) separate volume into stabilizing and destabilizing components; and (iii) distinguish between the various ways that FTTs can affect the prices of securities. For these reasons, the results in the empirical literature are mixed.

to a statistically significant increase in volatility (Box 1). This relationship is illustrated in Chart 1. Similarly, Umlauf (1993) concludes that an increase in an FTT in the Swedish stock market in the 1980s yielded greater volatility (Box 2). Baltagi, Li and Li (2006) also observe a significant rise in volatility following an increase in the FTT in the Chinese stock market.

Studies in the second group find an inverse relationship between FTTs and volatility. Liu and Zhu (2009) conclude that a reduction in commission rates at the Tokyo stock exchange, which is analogous to a one-time decline in an FTT, results in increased volatility. Notwithstanding this finding, empirical evidence demonstrating this relationship is limited.

The third group of studies finds that volatility is not affected following a change in the level of an FTT. Roll (1989), for example, examines the volatility of stock returns in 23 countries and finds no evidence that volatility is related to transaction taxes. Other studies that examine transaction taxes in the United Kingdom, Hong Kong, Japan, Korea, Taiwan and India also find no relationship between an FTT and volatility (Saporta and Kan 1997; Hu 1998; Phylaktis and Aristidou 2007; Sahu 2008).

On balance, the literature suggests that an FTT is unlikely to reduce volatility and may instead increase it, which is consistent with arguments made by opponents of the tax.

◀ *A financial transaction tax is unlikely to reduce volatility and may instead increase it*

Box 1

New York State's Financial Transaction Tax: A Case Study

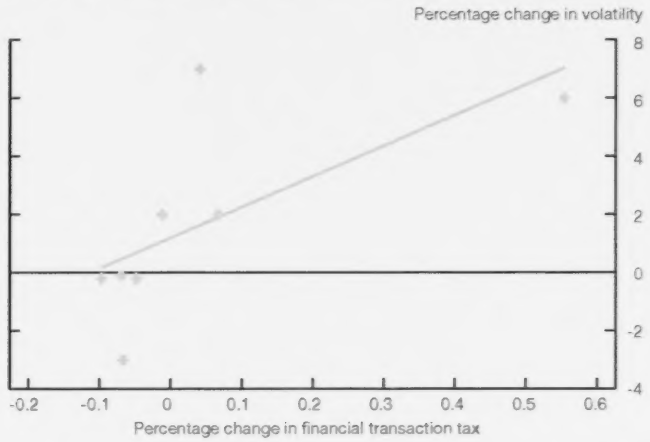
Pomeranets and Weaver (2011) examine how nine changes in the level of a financial transaction tax (FTT) on equity transactions in New York State between 1932 and 1981 affected volatility, liquidity and volume on the New York Stock Exchange (NYSE) and the American Stock Exchange. New York imposed an FTT in 1905 based on the par value of stocks. In 1932, during the Great Depression, the state doubled the tax to raise additional revenues. By 1933, a number of companies had lowered their par values to reduce the effect of the FTT, and New York had changed the tax schedule to one based on stock prices rather than par values. After 1933, the state adjusted the tax three times. The NYSE suffered from this tax burden and often lobbied against the transaction tax, arguing that the tax put it at a competitive disadvantage relative to regional exchanges that are located outside of New York. Over the years, the NYSE threatened to move out of the state to avoid the tax. Finally, in 1978, a four-year phase-out period began and the state FTT was eliminated in 1981.

Pomeranets and Weaver (2011) find that the New York FTT:

- increased volatility,
- increased the bid-ask spread,
- increased price impact, and
- decreased volume on the NYSE.

Since bid-ask spreads are directly related to a firm's cost of capital, imposing an FTT may hinder economic growth by reducing the present value of projected profits. Based on the evidence presented, the authors conclude that an FTT hinders market quality.

Chart 1: **Volatility and the New York financial transaction tax, 1932–81**



Note: The last observation is in 1981 because the New York FTT was eliminated at that time.
Source: Pomeranets and Weaver (2011) Last observation: October 1981

Box 2

The Financial Transaction Tax in Sweden: A Case Study

Umlauf (1993) examines how financial transaction taxes (FTTs) affect stock market behaviour in Sweden. In 1984, Sweden introduced a 1 per cent tax on equity transactions, which was doubled to 2 per cent in 1986. Umlauf studies the impact of these changes on volatility and finds that volatility did not decline following the increase to the 2 per cent tax rate, but equity prices, on average, did decline.

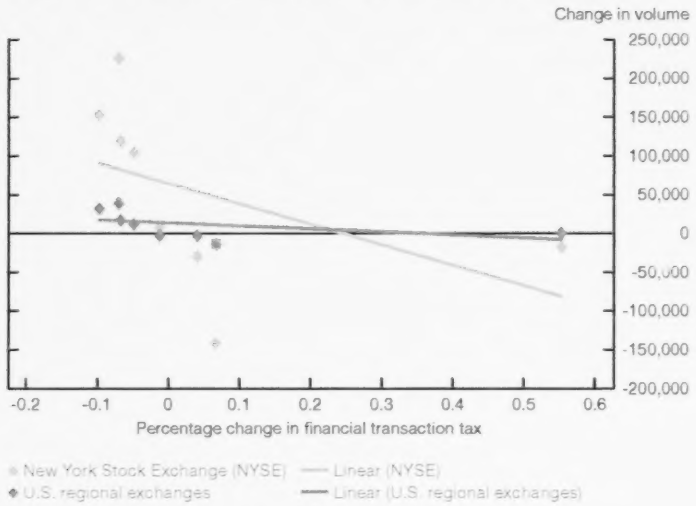
Furthermore, Umlauf concludes that 60 per cent of the trading volume of the 11 most actively traded Swedish share classes migrated to London to avoid the tax. After the migration, the volatilities of London-traded shares fell relative to their Stockholm-traded counterparts. As trading volumes fell in Stockholm, so did revenues from capital gains taxes, completely offsetting the 4 billion Swedish kronor that the tax had raised in 1988.

Volume

Opponents of the FTT, such as Grundfest and Shoven (1991) and Schwert and Seguin (1993), suggest that an FTT could lower market volume or market share in several ways: traders could carry out fewer trades or stop trading entirely in response to higher trading costs, or they could either migrate trading to an untaxed trading venue or substitute taxed assets for a different asset class altogether.[6] Proponents of the tax, such as Summers and Summers (1989), recognize that migration is a risk, but suggest that this risk can be eliminated with an international, uniform transaction tax.

6 Migration refers to the movement of trading activities from a taxed location to an untaxed location. Substitution refers to the transfer of trading activities from taxed financial instruments to untaxed ones.

Chart 2: **Trading volume at the NYSE and regional stock exchanges after a change in the New York financial transaction tax, 1932–81**



Note: The last observation is in 1981 because the New York FTT was eliminated at that time.
Source: Pomeranets and Weaver (2011) Last observation: October 1981

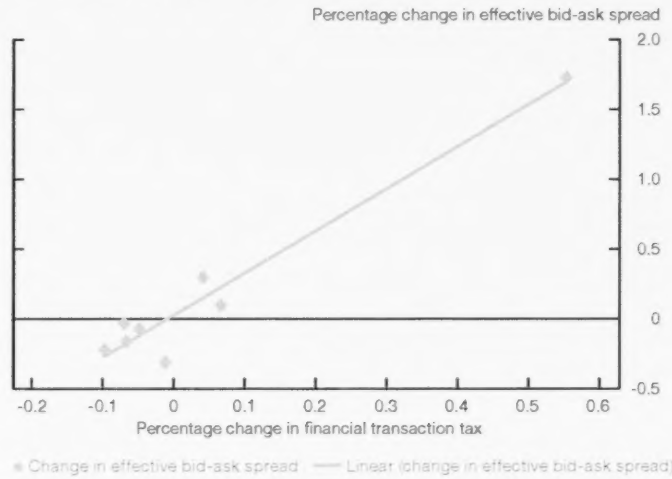
The consensus in the empirical literature is that a transaction tax is associated with declining trading volume. Pomeranets and Weaver (2011) conclude that, after an increase (decrease) in the FTT in New York, volume on the New York Stock Exchange (NYSE) experienced a statistically significant decline (rise) (Chart 2). An increase in the level of the state-imposed tax is also associated with a migration of volume from the NYSE to regional exchanges in the United States. Similarly, Jones and Seguin (1997) conclude that the deregulation of fixed commissions (which results in a one-time decline in transaction costs) is accompanied by an increase in total trading volume.

These results are consistent with the theoretical literature, which suggests an inverse relationship between volume and the transaction tax. When an FTT is imposed, traders are discouraged from trading on affected exchanges and look to trade on exchanges with lower costs. As a result, an FTT drives volume from the taxed exchange to an untaxed venue. Campbell and Froot (1994) examine the effects of an FTT in 20 countries and conclude that an increase in the tax results in a loss of market share domestically and an increase in market share abroad. Similarly, Umlauf (1993); Baltagi, Li and Li (2006); and Bloomfield, O'Hara and Saar (2009) conclude that an increase in an FTT results in a decline in market share in the home country.

Liquidity

Some advocates of FTTs contend that even though the transaction tax might result in "thinner" markets by discouraging sellers and buyers, it would not increase the bid-ask spread. Stiglitz (1989) recognizes that, although it may take more time for a buyer and seller to match in a thinner market, the extra seconds or minutes would not have a significant effect on liquidity. This argument may have been valid in 1989; today, however, trades are measured in fractions of a second and the extra time that buyers and sellers take to enter the market will be felt by many market participants and could affect liquidity.

Chart 3: **Effective bid-ask spread and the New York financial transaction tax, 1932–81**



Note: The last observation is in 1981 because the New York FTT was eliminated at that time.
Source: Pomeranets and Weaver (2011) Last observation: October 1981

Critics of the FTT argue that it reduces market liquidity by making each trade more costly, simply because it is a tax and also because market forces react to it by offering fewer and lower-quality trading opportunities. The cost impact is evident in the way the FTT widens the bid-ask spread. Bid-ask spreads compensate traders for three things—order-processing costs, inventory risk and information risk—often called the three components of the bid-ask spread. The FTT will increase the costs of these three components in the following ways:

Critics of the financial transaction tax argue that it reduces market liquidity by making each trade more costly, which is evident in the way it widens the bid-ask spread

(i) The order-processing component compensates liquidity providers for the fixed costs of trading. An FTT will increase the cost of this component because the decline in volume reduces the number of trades from which traders can recover the fixed costs.

(ii) The inventory-risk component compensates liquidity providers for holding inventory in order to match present buyers with future sellers and vice versa. Since equity traders may use derivatives to hedge their risky inventory positions, an FTT on derivatives will raise the cost of hedging, increasing the inventory-risk component of the bid-ask spread.

(iii) The information-risk component compensates liquidity providers for the risk that they may be dealing with a trader with more information on the fundamental value of the asset. If an FTT reduces the amount of noise trading, as proponents suggest, then there is a greater possibility that the liquidity provider will face an informed trader, increasing the information-risk component of the bid-ask spread (Schwert and Seguin 1993).

Two studies empirically examine the relationship between an FTT and bid-ask spreads. Pomeranets and Weaver (2011) conclude that changes in FTTs are associated with a positive and statistically significant change in the bid-ask spread (**Chart 3**). Bloomfield, O'Hara and Saar (2009) use a laboratory setting to study the impact of FTTs on the bid-ask spread. They conclude that bid-ask spreads may increase or decrease with the introduction of an FTT, depending on the strength of countervailing forces associated with the components of the bid-ask spread.

Cost of capital

Another measure of market quality examined in the literature is the cost of capital. Amihud and Mendelson (1992) conclude that a 0.5 per cent FTT would lead to a 1.33 per cent increase in the cost of capital. This result is consistent with their previous work that finds a positive relationship between required rates of return and transaction costs (Amihud and Mendelson 1986). When the cost of acquiring a security increases, its required rate of return and cost of capital also increase. As a result, an FTT would increase the cost of capital, which could have several harmful consequences. It could reduce the flow of profitable projects, shrinking levels of real production, expansion, capital investment and even employment.

A financial transaction tax would increase the cost of capital, which could reduce the flow of profitable projects, shrinking levels of real production, expansion, capital investment and even employment

The evidence presented suggests that FTTs harm market quality. FTTs have been shown to increase volatility, reduce volume and liquidity, and increase the cost of capital. Proponents of FTTs, however, may view these changes as signs of success and thus they propose and support the implementation of these taxes (Table 1 provides a list of G-20 countries that had imposed FTTs by 2010).

Table 1: **Financial transaction taxes in G-20 countries, up to 2010**

Country	Equity	Bonds/Loans	Foreign exchange transactions	Options	Futures
Argentina	Federal stamp duty on share transfers abolished in 2001	Provincial stamp duty, usually at 1%, may affect bonds and debentures			
Australia	State-level taxes may apply to shares	State-level taxes may apply to loans and bonds			
Brazil	1.5% on equity issued abroad as depository receipts (reduced from 3% in 2008)	1.5% on loans (reduced from 3% in 2008)	0.38% on foreign exchange transactions; 5.28% on short-term transactions (<90 days)		
China	0.1% of principal				
France	15–30-basis-point tax abolished on 1 January 2008				
India	0.25% on stock price; 0.025% on intraday transactions; local stamp duties may also apply	Local stamp duties may apply		0.017% on premium; 0.125% on strike price	0.017% of delivery price
Indonesia	0.1% on value of shares; local stamp duties may also apply	Local stamp duties may apply			
Italy	0.01%–0.14% of shares traded off exchange	0.25%–2% on loan principal			
Russia		Capital duty of 0.2% of value of new issues, but not on initial public offering of company			
South Africa	0.25% of value; new share issues excluded				
South Korea	0.5% on value of shares in corporations or partnerships				
Turkey	Initial charge for obtaining stock market quote: 0.1%; annual maintenance charge: 0.025%	0.6%–0.75% bond issuance charge	0.1% on foreign exchange transactions by financial institutions eliminated in 2008		
United Kingdom	Stamp duty of 0.5% on secondary sales of shares and trust holding shares			50 basis points on strike price, if executed	50 basis points on delivery price

Source: Matheson (2011)

Tax Revenues and Implementation Challenges

In addition to the effect on market quality, there are many unanswered questions concerning the design and effectiveness of an FTT. It is difficult to design a fair and efficient FTT that would minimize circumvention. The revenue collected through an FTT might therefore be considerably less than simple estimates would suggest, owing to substitution and migration. When designing an FTT, there are a number of questions to address: (i) which financial instruments to tax; (ii) at what rate to tax them; (iii) when and where in the trading process to collect the tax; (iv) at what location to apply the tax; and (v) whether it should be global.

It is difficult to design a fair and efficient financial transaction tax that would minimize circumvention, and the revenue collected might be considerably less than simple estimates would suggest, owing to substitution and migration

Which financial instruments should be taxed?

The EU's recent proposal for an FTT targets stock, bond and derivatives transactions. While taxing stock transactions appears to be relatively straightforward, taxing other asset classes may encounter some obstacles.

Tobin (1978) proposed a tax on spot foreign exchange (FX) transactions. Taxing FX options, however, could be difficult if these options are not exercised in the spot or forward markets. If they are exercised and taxed in the spot or forward markets, substitution with synthetic options and more complex derivatives may occur. Alternatively, if they are exempt from taxation, activity from the forward and futures markets may migrate to the options market to avoid the tax. Since market participants are adept at substituting lower-taxed instruments for higher-taxed ones, an FTT must be applied widely to reduce circumvention and to effectively capture the target market.

At what rate should instruments be taxed?

Campbell and Froot (1994) argue that the optimal tax structure should follow two principles:

(i) transactions that give rise to the same patterns of payoffs should be taxed at the same rate; and

(ii) transactions that require similar resources should be taxed at the same rate.

The first principle mitigates the possibility of substitution between different instruments with similar payoffs, since, as Campbell and Froot (1994) explain, payoffs on derivatives can be replicated by the underlying asset, and vice versa. Once a transaction tax is in place, however, some payoff patterns will be less costly to achieve with derivatives, and others with the underlying asset. Thus, the first principle is difficult to implement.

The second principle requires applying similar tax rates to securities with similar transaction costs. For example, if purchasing derivatives is a less-expensive way to obtain exposure to a given underlying asset, then derivatives transactions should be taxed at a lower rate than more-expensive transactions in the cash market. This differential tax treatment would, however, widen the gap between transaction costs in the cash and derivatives markets. Moreover, indirect resource costs such as negative externalities in the financial markets (e.g., excess volatility, higher risk premiums and misallocated investment in speculative activities) would ideally need to be accounted for. Since this would present considerable difficulties, this principle would also be difficult to implement.

When and where should the tax be collected?

Another practical concern with transaction taxes is when and where within the trading process the FTT should be collected. Kenen (1996) argues that the tax should be applied at the dealing sites precisely at the moment the deal occurs between two counterparties. Alternatively, the tax could be charged at the settlement site because that is where transactions are centralized. Spratt (2006) and Schmidt (2008) argue that levying the tax at the settlement phase may reduce concerns about tax avoidance because every transaction is tracked electronically. However, if the tax is collected at the settlement site, there would be incentives for banks and traders to move transactions away from those settlement systems and to establish less-centralized settlement systems, which would create other issues and risks.

Should a financial transaction tax be applied at the location of the trade or the location of the firm?

An additional concern with imposing an FTT is territoriality. An FTT can be applied to transactions based on the location of the trade, requiring governments to collect the tax from all participants trading within their jurisdiction, or based on the location of the firm, requiring financial institutions to pay the tax on the proceeds of their worldwide trading locations to the country where they are headquartered.

There are drawbacks to both options. If the tax is applied to the location of the trade, it will encourage the creation of tax-free havens and the migration of trading to those locations. This migration will significantly reduce the tax revenues that governments could collect. If the tax is based on firm location, firms headquartered in countries that impose a transaction tax would be at a comparative disadvantage and may consider relocating to jurisdictions without transaction taxes. In addition, firms would have the extra burden of consolidating data from their trading locations.

Great care should be taken in defining policies regarding territoriality, since gaps in definitions could result in tax evasion. Furthermore, coordination across jurisdictions would need to be developed to avoid both double taxation and tax avoidance.

Should a financial transaction tax be global?

A global FTT that is applied to all asset classes would mitigate concerns of migration and substitution. However, since a number of countries oppose transaction taxes, a global FTT is implausible. To mitigate the potential formation of a shadow market in certain jurisdictions in an attempt to avoid an FTT, co-operation would be required across all countries, which may be particularly challenging since recent technological advances have, in principle, given many countries the opportunity to host financial centres.

Even if a global FTT were implemented, there would likely be certain exemptions. Transactions in the primary markets, for example, would likely be exempt from an FTT to avoid the impact on the financing of companies in the real economy. In addition, a limit on the maximum tax liability for investors, based on either transaction volume or size, may be imposed.

Conclusion

This article examines the main arguments regarding the costs and benefits of FTTs and explores some of the significant practical issues surrounding the implementation of an FTT. Little evidence is found to suggest that an FTT would reduce speculative trading or volatility. In fact, several studies conclude that an FTT increases volatility and bid-ask spreads and decreases trading volume. Furthermore, a number of challenges associated with the design and effectiveness of an FTT could limit the revenues that FTTs are intended to raise. For these reasons, countries considering the imposition of FTTs should be aware of their negative consequences and the challenges involved in implementation.

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Access, Competition and Risk in Centrally Cleared Markets

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- Central counterparties manage and mitigate counterparty credit risk in order to make markets more resilient and reduce systemic risk. Better management of counterparty risk can also open up markets to new participants, which in turn should reduce concentration and increase competition. These benefits are maximized when access to central counterparties is available to a wide range of market participants.
- In an over-the-counter market, there is an important trade-off between competition and risk. Concentrated, less competitive markets are more profitable and thus participants are less likely to default. But a central counterparty that provides sufficient access can improve this trade-off, since the gains from diversification—which will become greater as participation grows—can simultaneously reduce risk and increase competition.
- Regulators have developed, and central counterparties are implementing, new standards for fair, open and risk-based access criteria. Such standards will, among other things, counter any incentives that might exist for members of a central counterparty to limit access in order to protect their market share.

Greater use of central counterparties (CCPs) for over-the-counter (OTC) markets is a key element of the G-20 response to the financial crisis of 2007–09. A CCP mitigates and manages counterparty risk in a market by standing between the original counterparties and guaranteeing they will meet their obligations. During the crisis, CCPs played an important role in supporting the continued functioning of markets under stressful conditions.[1] Hence, in 2009, the leaders of the G-20 countries agreed that all standardized derivatives should be cleared through CCPs.[2] CCPs are also being introduced in other markets, such as the market for repurchase agreements.[3] Greater use of central clearing could improve the safety and resilience of the financial system, help control systemic risk, and limit the problems caused by institutions considered "too big to fail" (Chande, Labelle and Tuer 2010). Central

1 The Global Association of Central Counterparties (CCP12 2009) describes how CCPs supported the operation of cleared markets through the Lehman default, in contrast to the bilaterally cleared market for credit default swaps that largely froze up.

2 Wilkins and Woodman (2010) discuss the role of CCPs in the international agenda to reform OTC derivatives markets.

3 Chatterjee, Embree and Youngman (2012) review the Canadian initiative to introduce a CCP in the market for repurchase agreements.

clearing may also open up markets to greater competition. In the wake of the crisis, international standard-setting bodies have put in place new principles for open access to CCPs.

This article describes how the introduction of a CCP can change the structure of a cleared market in two opposite ways. The ability of a CCP to effectively manage counterparty credit risk makes it easier for new entrants to participate in the market, leading to more-intense competition. But CCPs also need to have strong access rules in place to control risk. The article describes the model of Fontaine, Pérez Saiz and Slive (2012), which explains how the trade-off between risk and competition in OTC markets determines the optimal level of market access and how the introduction of a CCP can fundamentally change this trade-off. In the model, clearing members may have incentives to favour access and risk controls at a CCP that limit direct participation below the socially optimal level. Alternative ways to access clearing services—through indirect clearing arrangements and linked CCPs—may have similar challenges. These findings help to explain why the regulatory community has developed, and CCPs themselves have been implementing, principles to support more-open access to CCPs.

Improving Risk Control and Competition Through Central Clearing

The objective of a CCP is to centralize and manage counterparty credit risk by acting as the counterparty for every transaction cleared. The CCP establishes risk controls, including membership requirements and default-management procedures, which allow the CCP to honour its commitments in the event of the default of a member. The default-management framework includes risk sharing, or mutualization, among members: if a member defaults and the resources it has provided prove insufficient, other members may be required to absorb the cost of honouring the defaulting member's outstanding trades.

Central clearing has the potential to both reduce risk and improve competition in OTC markets. The risk reduction comes from several sources. First, risk sharing in the CCP provides benefits from diversification similar to those created by an insurance company (Koeppl and Monnet 2010; Biais, Heider and Hoerova 2012). In addition, by centralizing the management of counterparty credit risk and simplifying a complex network of counterparty exposures, a CCP improves the transparency of the cleared market, which allows for more-effective management of counterparty risk (Acharya and Bisin 2010). A CCP can also reduce counterparty exposures and collateral requirements through multilateral netting: amounts owed to one counterparty can be offset by amounts due from another counterparty (Jackson and Manning 2007; Duffie and Zhu 2011). Overall, the ability of a CCP to effectively manage counterparty credit risk can lead to a reduction in systemic risk. By decreasing the risk of counterparty defaults and managing effectively those defaults when they do occur, a CCP lowers the probability that one default will lead to another and reduces the likelihood of market disruptions, thereby ultimately increasing the resilience of the financial system.

◀ *The ability of a central counterparty to effectively manage counterparty credit risk can lead to a reduction in systemic risk*

The improved management of counterparty credit risk at a CCP opens markets to greater participation, which can increase competition. In OTC markets that are cleared bilaterally, participants are directly exposed to the risk that their counterparties may default and therefore have an incentive to restrict trading to counterparties that are known to be creditworthy. When a

CCP with strong risk controls takes on the management of credit risk, however, participants can feel more secure trading with others—even anonymously—since the CCP guarantees that the terms of the trade will be honoured.

The CCP's ability to provide multilateral netting also reduces the incentive to trade with only a limited number of counterparties. With bilateral clearing, amounts owing can be offset by amounts that are due only when both transactions have the same counterparties. Netting is therefore maximized when transactions are concentrated among a small number of counterparties. Under multilateral netting, all trades cleared at a CCP will be offset, regardless of the counterparty.

Central clearing can therefore reduce the incentive to trade with only the largest dealers, thus opening the market to more participants. For example, one of the earliest CCPs cleared trades in the cotton market at Le Havre, France, in the late nineteenth century. It proved so successful in increasing participation and trading that commodity markets across Europe had little choice but to introduce their own CCPs or lose market share (Norman 2011).

◀ *Central clearing can reduce the incentive to trade with only the largest dealers, thus opening the market to more participants*

Strong but Appropriate Access and Risk Controls

To fully realize the benefits of reduced risk and improved competition in the market, CCPs themselves must be robust. A strong CCP is particularly important since, in taking on the management of counterparty credit risk, a CCP reduces the incentive for market participants to monitor their own counterparties and to enforce the same level of market discipline as they would in a bilateral market (Koeppl 2012).[4] CCPs must therefore have strict procedures for managing credit, liquidity, settlement and operational risks.

CCPs also require access controls to help ensure that only institutions that have the ability to manage risks in the clearing system become clearing members. The CCP must be able to replace the portfolio of a defaulted member in order to honour its commitments to the defaulted member's counterparties. Since defaults are rare, a CCP does not typically maintain the technical capacity to directly enter the market to close out positions (though it must hold the financial resources to do so). To reduce the financial stress caused by a default, the CCP counts on the surviving members to provide the technical support to execute the necessary transactions, as well as the financial resources to carry out its default-management responsibilities. A CCP's access controls should ensure that participants are able to assist in managing the default of a member. Thus, direct participation is appropriately limited to members with adequate financial and technical resources.[5]

If access controls are too strict, however, they may limit participation, which, in addition to potentially reducing competition, may work against the objective of controlling risk by increasing concentration. If direct access to a CCP was limited to the largest dealers, their systemic importance would increase, potentially exacerbating the "too-big-to-fail" problem and preventing the CCP from providing the full benefits of diversification. Limited access could also make mid-tier institutions more vulnerable in times of stress and slow the transition to central clearing (Slive, Wilkins and Witmer 2011).

4 Members will have incentives to protect the safety of the CCP because of their role in mutualizing risk.

5 The requirement to assist with a default does not necessarily exclude smaller institutions from CCP membership. Small members may be able to contribute to the default-management process in proportion to their size if they are given the appropriate incentives (Duffie 2010). As well, some regulators require that CCPs allow members to outsource the technical obligations to assist in default management (Commodity Futures Trading Commission rule 17 CFR 39.16(c)(2)(iii)).

Indirect clearing—where market participants obtain clearing services as clients of clearing members—is an alternative but, as will be discussed, it does not necessarily eliminate all of these concerns.

Regulators have recognized the importance of having robust CCPs with rules that promote open access to clearing while maintaining strong risk controls. The Financial Stability Board identified fair and open access to CCPs as one of four safeguards needed to establish a safe environment for clearing OTC derivatives (FSB 2012).[6] The Committee on the Global Financial System identified the need for broad access to CCPs (CGFS 2011), while the Committee on Payment and Settlement Systems and the Technical Committee of the International Organization of Securities Commissions made fair, open and risk-based access to CCPs one of their new Principles for Financial Market Infrastructures (CPSS-IOSCO 2012). The model discussed in the next section helps to explain further why regulators have focused on the issue of access.

Regulators have recognized the importance of having robust central counterparties with rules that promote open access to clearing while maintaining strong risk controls

Clearing Rules and Incentives for Market Participants

Although final approval of rules always rests with regulators, large global dealers have historically influenced the rules at CCPs that clear OTC derivatives. CCP participants have a legitimate interest in ensuring that a CCP's rules and controls—including, for example, membership requirements, margin requirements, indirect clearing arrangements and the nature of any links among CCPs—do not place undue risk on those who share risk at the CCP and do not undermine the robustness of the CCP itself. Participants therefore should have an influence over CCP rules, either through their ownership of the CCP or through their participation in a risk committee that determines the rules. But if these rules lead to an excessive concentration of risk among a small number of clearing members, they may actually increase the risks to the CCP and to the market.

Because market participants could influence CCP rules, it is important to understand the incentives of participants. Fontaine, Pérez Saiz and Slive (2012) examine these incentives and their relationship to risk and competition at a CCP (**Box 1**). Their model analyzes two groups of market participants: hedgers (for example, non-financial corporations, pension funds or investment managers) and dealers, who can reduce some of the risk in a hedger's portfolio through trading. Dealers also face shocks that may cause them to default, leaving hedgers exposed to the initial risks.

Because market participants could influence central counterparty rules, it is important to understand the incentives of participants

If there is no CCP in a market, then increasing the number of dealers has both advantages and disadvantages for hedgers. More dealers will mean greater competition, decreasing the price that hedgers will pay. But the more-intense competition also decreases the revenue of dealers, leaving them with a smaller buffer to withstand financial shocks and raising the probability of their default, all else being equal. Together, these effects create a trade-off between competition and risk much like the one found in a number of studies of bank regulation (Vives 2010). It is good to have enough dealers to encourage competition, but not so many dealers that they do not have sufficient revenue to survive an external shock to their businesses.

6 The other three safeguards for CCPs are co-operative oversight arrangements, recovery and resolution regimes, and appropriate liquidity arrangements in the currencies they clear.

Box 1

A Model of an Over-the-Counter Market with a Central Counterparty

In the model constructed by Fontaine, Pérez Saiz and Slive (2012), hedgers reduce the risk to their assets by trading with dealers who offer a swap contract that exchanges the hedger's uncertain payment for a certain payment. The dealers can transfer the risk to other markets or investors. But the risk from the swap contract cannot be entirely passed on, and dealers retain a residual risk to their cash flows. Depending on whether the size of the shock from the swap exceeds their revenues, dealers may default, leaving hedgers unprotected, since dealers have limited liability and do not fully internalize the consequences of their default. However, hedgers understand that dealers may default, and this possibility is reflected in the price they are prepared to pay to enter a swap contract. (Under the swap contract, hedgers cannot default.)

Dealers have market power because they are differentiated (as in Salop (1979)): each dealer offers a menu of services that is aligned with the needs of only some hedgers. For example, dealers may offer swaps to hedgers who are clients of their commercial loans or prime brokerage businesses. A rise in the number and diversity of dealers in the market increases competition, reduces the price that hedgers pay to dealers and also decreases the revenue of each individual dealer. Among a small number of dealers, each is a local monopoly with respect to their most-aligned clients. Once enough dealers are in place to remove the local monopoly, the result already noted holds. The discussion, however, focuses on markets without local monopolies.

Fontaine, Pérez Saiz and Slive (2012) introduce central clearing to this type of market. A central counterparty (CCP) will improve efficiency by diversifying the risk of default of an individual dealer, as in Koeppl and Monnet (2010). In the Fontaine, Pérez Saiz and Slive model, the CCP establishes two rules: (i) an access rule that limits the number of dealers that can clear through the CCP, and (ii) a dealer risk limit that controls the probability that dealers will default by limiting the trades each dealer can take on. These are a reduced form of a more realistic set of CCP rules, which typically impose resource and performance requirements, in addition to other fixed costs, on members and margin requirements on trades.

Dealers can offer a swap contract only if they are members of the CCP. Hedgers are not members but can be thought of as indirect participants clearing through dealers (see the section "Alternative Pathways to Clearing in Over-the-Counter Markets" on page 20).

Fontaine, Pérez Saiz and Slive (2012) show that, when a CCP is introduced into a market, the classic trade-off between competition and risk may be fundamentally altered. In their model, trades are cleared through a CCP that implements access rules and places risk limits on participants. Under central clearing, increasing the number of dealers still lowers prices but the effect on the risk is less pronounced. The CCP helps to diversify default risk. It therefore creates a new trade-off between the greater default risk arising

Box 2

Regulatory Requirements for Fair and Open Access

At the request of national regulators, central counterparties (CCPs) had begun to implement open, risk-based access requirements even before the new Principles for Financial Market Infrastructures (CPSS-IOSCO 2012) took effect. An example from an interest rate swap CCP—LCH.Clearnet's SwapClear—is provided in **Table 2-A**.

Table 2-A: **Changes to the membership requirements of LCH.Clearnet's SwapClear (2012)**

	Former requirements	New requirements
Minimum capital	US$5 billion	US$50 million (scaled to the amount of risk assumed)
Minimum book size	US$1 trillion	None
Credit rating	"A" or equivalent from Moody's, Standard & Poor's, or Fitch Ratings	CCP assesses members based on a number of criteria, including credit ratings, financial ratios, market-implied ratings (e.g., from credit default swaps), support of parent companies and operational capabilities.
Performance	Members must prove their operational capacity to assist in the orderly unwinding of a defaulting member's portfolio through a default-management "fire drill."	Members must prove their operational capabilities in the event of a default and their ability to provide the CCP with live, executable prices in currencies they clear, through "fire drills"; however, they can outsource these responsibilities to a third party, subject to the CCP's approval.

from the lower revenue earned by each dealer and more diversification inside the CCP from the growth in membership. Hedgers prefer more-open access in a CCP compared with the non-centrally cleared market.[7]

The preferences of dealers in the model do not reflect the competition-risk trade-off. Since dealers have limited liability, they do not internalize the costs of default and therefore will always favour low participation in order to increase prices and profits. A CCP tilts hedgers' preferences toward more open access, but does not affect the incentives of dealers. If dealers can influence the rules of a CCP, they will favour access rules that are stricter than those favoured by hedgers. This creates an important role for regulators to ensure that access rules reflect both sides of the competition-risk trade-off.[8]

If dealers can influence the rules of a central counterparty, they will favour access rules that are stricter than those favoured by hedgers

Even if open access is required (Box 2), the model predicts that dealers will have incentives to influence other rules of the CCP to limit competition. By implementing strict risk controls (for example, position limits or margin requirements), a CCP can reduce the effect of competition on prices, thereby lowering the supply of swap contracts in the market and increasing profits for dealers. The model predicts that risk limits can act as a coordination device, allowing dealers to enforce a lower level of competition. When reviewing the appropriateness of CCP rules, regulators should therefore consider how a stricter rule (for example, access criteria) could influence incentives for setting other rules (for example, per-member risk controls).[9]

7 Other CCP rules and actions that are not directly modelled here (such as performance or technical requirements) also limit the effect of competition on default and tilt the hedgers' preferences toward greater access.

8 The model does not fully incorporate other risk-management benefits of a CCP, including enhanced transparency and multilateral netting, nor does it take into account external changes affecting systemic risk. On one hand, for example, open access might result in increased defaults, which could have harmful effects on uncleared markets where the defaulter participates. On the other hand, open access could reduce the prominence of systemically important financial institutions, which might help to reduce the systemic-risk externalities resulting from defaults.

9 Pirrong (2000) makes a similar point in the context of stock exchanges: regulating a market can be particularly challenging when competitive forces interact with complex governance structures.

Alternative Pathways to Clearing in Over-the-Counter Markets

Investors can access clearing services without being direct members of CCPs. Alternatives include tiered access to clearing and the presence of multiple—possibly linked—CCPs clearing the same market. But competition in the cleared market may affect these alternative pathways as well, and their existence does not eliminate the need to consider market structure and concentration when setting CCP rules.

Indirect clearing

Indirect clearing offers an alternative means of accessing central clearing for those who do not qualify for direct membership or do not wish to be members. In some CCPs, an investor can clear indirectly as the client of a direct clearing member. With this kind of tiering, a CCP can rely on its direct clearing members to control the risk of their indirect clearing clients, which can be an efficient way to manage risk. But it may result in risk being concentrated in a small number of direct clearers, making it more difficult for the CCP to manage the failure of its largest members (Galbiati and Soramäki 2012).[10]

In some central counterparties, an investor who does not qualify for direct membership or does not wish to be a member can clear indirectly as the client of a direct clearing member

Indirect clearing arrangements, by themselves, are unlikely to eliminate the competition effects illustrated in the model of Fontaine, Pérez Saiz and Slive (2012). The suppliers of indirect clearing services are the direct clearers, suggesting that limited access to direct clearing could, without appropriate regulatory intervention, give rise to market power over indirect clearing services. In addition, indirect clearing could be more expensive than direct clearing and it could raise risk-management challenges (Slive, Wilkins and Witmer 2011).

Multiple central counterparties and links among them

Clearing a single market or product through several CCPs could reduce the ability of the members of one CCP to influence competition, as described by Fontaine, Pérez Saiz and Slive (2012). Competition among CCPs might lead to a lower concentration of risk and less influence for individual CCP members. For example, if a group of smaller dealers were excluded from a CCP, they could set up their own, separate CCP. But dividing clearing among several CCPs introduces the possibility of substantial costs and risks: CCPs might lower risk controls in order to compete for market share, and increasing the number of CCPs reduces the efficacy of multilateral netting, since exposures cleared at one CCP typically cannot be offset by exposures at a different CCP. Clearing at multiple CCPs therefore increases risk exposures as well as the cost of collateralizing these exposures across the financial system as a whole. Like other market infrastructures, CCPs are also subject to economies of scale that encourage participants to concentrate clearing in a single location.

Clearing at multiple central counterparties increases risk exposures as well as the cost of collateralizing these exposures across the financial system as a whole

Links among CCPs could make multiple CCPs more efficient, but they could also result in cross-border and other legal and regulatory problems that may be difficult for both CCPs and regulators to resolve. Links could allow two market participants that belong to different CCPs to clear trades between the CCPs, or multiple CCPs to net the exposures of their common members (Mägerle and Nellen 2011). In either situation, multilateral netting could be enhanced, thereby reducing the costs of clearing. Such links,

10 A CCP can attempt to transfer the clients of a failed clearing member to another clearing member, but this too will be more challenging if indirect clearing services are concentrated in a few large direct clearers, since there could be more clients to transfer and fewer surviving members to accept them.

however, create risk exposures among CCPs that may be difficult to manage; regulators must be assured of adequate management of these exposures before agreeing to the link. In addition, if dealers have the incentives to restrict competition that were modelled in Fontaine, Pérez Saiz and Slive (2012), these incentives would discourage them from agreeing to links that could create more competition. The European Commission has addressed this issue in relation to cash equity markets by putting in place requirements that CCPs accept linking arrangements. But these requirements are less feasible for CCPs that clear less-liquid markets such as OTC derivatives. In these markets, two linked CCPs would need extensive coordination to deal with defaults. Such coordination might be difficult to maintain when the link is based on a legal obligation rather than the incentives of participants.

Conclusion

CCPs can improve the management of risk and increase competition in OTC markets. In the model constructed by Fontaine, Pérez Saiz and Slive (2012), the incentives of dealers place pressure on CCPs to adopt overly restrictive rules that do not maximize safety and efficiency. Moreover, open-access rules alone may not be sufficient to correct this problem, since other controls such as margin requirements or position limits may also unduly limit competition.

The model helps to explain why regulators have created international standards, including the Principles for Financial Market Infrastructures (CPSS-IOSCO 2012), that recognize the importance of market structure and access issues in the creation of robust rules for CCPs. Recognizing the potential importance of competition when determining CCP rules is necessary, not only because of the direct benefits of efficient markets, but also because a less-concentrated market may be more effective in controlling systemic risk.

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Monetary Policy and the Risk-Taking Channel: Insights from the Lending Behaviour of Banks

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- The financial crisis of 2007–09 and the subsequent extended period of historically low real interest rates in a number of major advanced economies have revived the question of whether economic agents are willing to take on more risk when interest rates remain low for a prolonged time period.
- This type of induced behaviour—an increased appetite for risk that causes economic agents to search for investment assets and strategies that generate higher investment returns—has been called the risk-taking channel of monetary policy.
- Recent academic research on banks suggests that lending policies in times of low interest rates can be consistent with the existence of a risk-taking channel of monetary policy in Europe, South America, the United States and Canada. Specifically, studies find that the terms of loans to risky borrowers become less stringent in periods of low interest rates. This risk-taking channel may amplify the effects of traditional transmission mechanisms, resulting in the creation of excessive credit.

Most central banks conduct monetary policy by setting a target for a specific short-term interest rate. Changes to the short-term policy interest rate, all else being constant, induce changes to medium- and long-term interest rates, as well as to other financial indicators such as the exchange rate. These rates, in turn, affect economic activity by decreasing the cost of mortgages when the prime rate falls, by making it cheaper for firms to borrow when yields on corporate bonds go down or by increasing exports when the exchange rate depreciates. They can, therefore, ultimately lead to changes in economic activity, because they influence the spending and investment decisions of consumers and firms.[1]

The transmission of monetary policy to the broader economy takes place through several channels. The first, which can be considered the traditional channel, operates through both the overall level of interest rates and the exchange rate. This is because, on one hand, long-term rates depend on the average expected short-term interest rate, while, on the other hand, the expected change in the exchange rate (adjusted for foreign exchange risk) depends on the differential between domestic and foreign interest rates (Sarno and Taylor 2008, 18).

1 For a detailed description of the link between changes to the policy rate and economic activity, see Macklem (2002).

Additional channels through which policy rates affect firms that rely on bank financing are the balance-sheet channel and the bank-lending channel (Bernanke and Gertler 1995). Through the balance-sheet channel, shifts in the policy rate affect the financial position of borrowers. For example, all else being equal, accommodative monetary policy strengthens the balance sheets of firms because lower interest rates decrease the interest rate expenses on their short-term debt, which increases net cash flows and improves their financial positions. In addition, falling interest rates, typically associated with increasing asset prices, may improve the value of borrowers' collateral and hence access to bank loans.[2] Through the bank-lending channel, banks affect the spending and investment decisions of firms by shifting the supply of credit. For example, tight monetary policy drains reserves from the banking system, limiting the ability of banks to supply credit, all else being equal.[3]

The recent financial crisis has spurred a debate on whether an additional mechanism in the transmission of monetary policy—the risk-taking channel—affects the supply of credit (Rajan 2006; Borio and Zhu 2008; Boivin, Lane and Meh 2010). Through this mechanism, prolonged periods of low interest rates may induce banks to increase the supply of credit to riskier borrowers, resulting in an overall increase in the riskiness of bank loan portfolios.[4] The presence of the risk-taking channel implies that, because of an elevated appetite for risk in times of prolonged low interest rates, banks may increase their lending by more than they normally would through traditional transmission mechanisms. The effect of prolonged low interest rates, therefore, may be amplified because of an excessive tolerance of risk.[5]

◀ *Through the risk-taking channel, prolonged periods of low interest rates may induce banks to increase the supply of credit to riskier borrowers, resulting in an overall increase in the riskiness of bank loan portfolios*

In this article, we focus on the implications of the risk-taking channel for banks because the channel is often described in the context of bank lending behaviour, mainly owing to the systemic importance of banks.[6] We first discuss two ways in which the risk-taking channel operates: the search for yield and excessive expansion of bank balance sheets. We then review recent academic research that explores the risk-taking channel using microeconomic data. Finally, we review an empirical analysis of whether this channel functions in Canada.

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2 Changes in interest rates will not affect all firms in the same way. The magnitude of the effect will vary depending on the nature of the business, the size of the firm and its sources of finance. When interest rates decrease, for example, cash-rich firms may be in a worse financial position because they will receive less interest income from investments.

3 A key assumption of the bank-lending channel is that banks cannot (easily) replace deposits with other sources of funding such as certificates of deposit and/or new equity issues.

4 Interest rates can be considered "low" relative to different benchmarks such as the average policy rate or the rates predicted by a specific monetary policy rule, e.g., the Taylor rule, which describes the short-term rate in response to evolving macroeconomic fundamentals (Taylor 2009). When studying the risk-taking channel, it is necessary to identify prolonged periods in which rates remain low. One way in which interest rates are defined as low in this article is that the policy rate is considered low relative to a certain benchmark. It is important to note that rates remain low for several consecutive quarters, which allows us to define environments of low or high interest rates. We use the terms "low interest rates" and "accommodative monetary policy" interchangeably to avoid repetition.

5 Gambacorta (2009) also investigates monetary policy and risk taking, but outside the Canadian context.

6 Carney (2010) outlines the implications of this risk-taking behaviour for the corporate sector and the household sector. A prolonged period of low interest rates could also affect insurance companies and pension funds, which usually have to meet nominal targets on their liabilities. In a low interest rate environment, lower returns on assets make payments on long-term liabilities more difficult to fulfill. Because of the obligation to meet nominal targets that are set in periods of higher interest rates, pension funds and insurance companies may invest in riskier assets rather than renegotiate or even default on their obligations.

The Risk-Taking Channel and the Behaviour of Banks

Understanding the effect of the risk-taking channel is important for policy-makers because it has implications for the transmission of monetary policy to the real economy and because it may also affect financial stability.

The risk-taking channel implies an increase in the risk tolerance of banks when interest rates remain persistently low. This behaviour can manifest itself as a change in a bank's portfolio composition from less-risky to more-risky assets, known as the "search for yield" (Rajan 2006). Asset and collateral values may also increase. Periods of low interest rates "could breed complacency, making us overconfident that good times are here to stay, and generate an excessive appetite for risk" (Boivin 2011). Economic agents such as banks may not adequately adjust their expectations about future interest rates, assuming instead that rates will remain low for an extended period. As a result, banks may originate an excessive amount of lower-quality credit because of softened lending standards. In addition, the loan rates of risky borrowers may decrease relative to the loan rates of less-risky borrowers, suggesting that the price of the former does not adequately reflect the cost of the risk.

During periods of low interest rates, banks may not adequately adjust their expectations about future interest rates, assuming instead that rates will remain low for an extended period

Another indication of the risk-taking channel is the excessive expansion of banks' balance sheets through leverage. Adrian and Shin (2010) suggest that banks actively manage their leverage (the ratio of total assets to equity) in response to changes in asset values. They find that investment banks expand their balance sheets through collateralized borrowing (transactions in which securities are provided as collateral) during periods of accommodative monetary policy and reduce them when monetary policy is tight. Using Canadian bank data, Damar, Meh and Terajima (2010) find a strong positive correlation between asset growth and leverage.

The expansion of bank balance sheets (through collateralized borrowing) may lead to the buildup of financial imbalances, which are vulnerable to rapid unwinding if investors become risk averse. This can lead to reduced liquidity, declines in marked-to-market values and forced asset sales. A discussion of the policies to limit the buildup of financial imbalances resulting from low interest rates is beyond the scope of this article. For more information on these policies and on the costs and benefits of using monetary policy to counteract financial imbalances, see Boivin, Lane and Meh (2010) and Bank of Canada (2011).

Evidence of the Risk-Taking Channel of Monetary Policy

The academic literature on the risk-taking channel examines whether banks extend relatively larger loans to riskier borrowers during periods of low interest rates. In addition, these studies associate the risk-taking behaviour of banks with a smaller difference between the loan rates of risky and less-risky borrowers in times of lower interest rates compared with times of higher interest rates.

Finding evidence of the risk-taking channel of monetary policy is a challenging empirical task. The risk-taking channel is supply-driven and generated by a greater appetite for risk by banks (and other lenders) when interest rates remain low for long time periods, but low interest rates also affect the demand for investments and credit, the quality of the pool of borrowers, and the volume of credit supplied (Bernanke and Gertler 1995). Therefore, to identify this channel in the banking sector, the effect of credit demand must be disentangled from the effect of credit supply—driven by low interest rates—on bank lending and pricing policies.

Jiménez et al. (2008) use exhaustive loan-level data combined with bank and firm information from Spain's Central Credit Register for the 1988–2008 period to examine whether monetary policy in the European Union led to the origination of riskier individual bank loans in Spain. They investigate the frequency of successful bank loan applications by firms as well as the amount and maturity of loans granted when interest rates decrease. Several of their results are consistent with the risk-taking channel: lower-capitalized banks are less likely to end existing loans to risky firms than are higher-capitalized banks when the short-term interest rate is low. Furthermore, with a low short-term rate, lower-capitalized banks are more likely to originate loans to applicants with a weaker credit history. These loans are also larger and have longer maturities.

Ioannidou, Ongena and Peydró (2009) use Bolivia's credit register, which includes all loans from 1999 to 2003, to estimate the causal effect of a change in interest rates on bank lending behaviour. Since the Bolivian peso was pegged to the U.S. dollar during that period, changes in U.S. monetary policy would affect the Bolivian economy, but not vice versa. The authors' results suggest that banks are more likely to originate loans to riskier borrowers when the policy rate (in this case, the federal funds rate) is low. Importantly, the difference between the loan rates to risky and less-risky borrowers decreases as the policy rate remains relatively low, even after controlling for the effect of economic activity.

Using data on the syndicated loan market over the 1990–2010 period, Paligorova and Santos (2012) examine whether the stance of U.S. monetary policy is associated with increased risk-taking behaviour by U.S. banks.[7] Their analysis compares the differences in all-in-drawn spreads[8] and loan amounts for risky and less-risky borrowers originated by the same bank and/or by the same bank to the same firm across different monetary policy environments. To control for a large number of factors that typically affect bank lending policies, they use information along three dimensions: (i) bank characteristics (size, equity ratio, liquidity, profitability); (ii) characteristics of the loan contract (all-in-drawn spread, type, reason, maturity); and (iii) firm characteristics (probability of default, investment opportunities, profitability, size, leverage).

Their results show that loan prices and sizes exhibit patterns that are consistent with the risk-taking channel: the difference in the all-in-drawn spreads between the loans to risky and less-risky borrowers decreases when interest rates remain lower relative to when they are higher. At the same time, the loan amounts are higher to risky borrowers than to less-risky borrowers when interest rates are low. These estimated impacts on spreads and the sizes of loans are obtained after accounting for the effects of loan, bank and firm characteristics, and macroeconomic circumstances.

To reduce concerns that these findings are driven by shifts in credit demand and/or supply factors that are not directly related to bank risk taking, Paligorova and Santos (2012) use a specific measure of the risk tolerance of banks. This measure is based on the Federal Reserve's Senior Loan Officer Opinion Survey on Bank Lending Practices (SLOOS), which collects qualitative information from senior officers about the willingness of banks to grant

7 Syndicated lending is an important source of financing. Sufi (2007) reports that syndicated loans comprise 15 per cent of average debt outstanding in U.S. non-financial corporations. This market grew from US$137 million in 1987 to over US$1 trillion in 2006.

8 The all-in-drawn spread is defined as the total (fees and interest) annual spread paid over the London Interbank Offered Rate for each dollar drawn down from the loan.

credit and their attitudes toward risk.[9] The authors find that the more risk-tolerant banks charge risky borrowers relatively less in times of low interest rates than in times of high interest rates. This result confirms that the lower differential between all-in-drawn spreads for risky and less-risky borrowers when interest rates are low versus when they are high is indeed associated with higher risk tolerance in banks, measured by qualitative data.

Research shows that the more risk-tolerant banks charge risky borrowers relatively less in times of low interest rates than in times of high interest rates

The Risk-Taking Channel and Canadian Banks

To explore the risk-taking channel in bank lending, it is necessary to have detailed information on three separate components—borrowers, banks and loans—available for different monetary policy environments. In Canada, the data source that meets the above criteria is from the syndicated loan market,[10] which is an important source of credit for large Canadian corporations.[11]

Using detailed data on syndicated loans for Canadian borrowers for the 1993–2010 period (from Thomson Reuters LPC), Paligorova and Santos (forthcoming) analyze all-in-drawn spreads of risky and less-risky borrowers across different monetary policy environments. The authors combine loan information with firm- and bank-level balance-sheet data to account for the effects of credit demand and credit supply.[12] They suggest that the risk-taking channel may be present in the syndicated loan market if the difference between the all-in-drawn spread for risky and less-risky firms is smaller in prolonged periods of low interest rates, compared with periods of higher interest rates.

The study uses linear regression analysis in which loan spreads depend on loan, firm and bank balance-sheet factors. The main estimate of interest is the relationship between firm risk and all-in-drawn spreads across different monetary policy environments.[13] Firm risk is defined using credit ratings: investment-grade firms are deemed to be "less risky," and non-investment-grade firms are considered "risky." The authors define a low

9 The survey questions are: "Over the past three months, how have your bank's credit standards for approving applications for [commercial and investment] loans or credit lines . . . to large and middle-market firms . . . changed?" and "If your bank has eased its credit standards or its terms for [commercial and investment] loans . . ., how important [has] been . . . increased tolerance for risk?" Aggregated quarterly information from the SLOOS is publicly available at <http://www.federalreserve.gov/boarddocs/SnLoanSurvey/>. Paligorova and Santos (2012) rely on bank-specific answers, which are confidential.

10 Syndicated loans have several distinct features. They are shared among multiple lenders that are liable as underwriters up to a specified portion of the total deal value of the loan. Syndicated loans can be either secured or unsecured, but holders of syndicated loans are always senior to all other creditors. Thus, the holders of syndicated loans must be repaid in full before the claims of junior debt holders. Syndicated loans are floating-rate instruments that make use of a reference rate (such as the London Interbank Offered Rate, the Canadian Dealer Offered Rate or the prime rate of a specified bank) to which a specified interest rate spread is added.

11 The total amount of newly issued syndicated loans in 2000 was $82 billion; in 2007, it reached an annual peak value of $192.4 billion, and then decreased to $93.7 billion in 2009. Over the 1993–2010 sample period, the mean and median values of the all-in-drawn spread (which is a measure of the cost of loans) were 235 and 225 basis points, respectively, above the London Interbank Offered Rate. The loan size ranged from $19 million (10th percentile) to $1.7 billion (95th percentile), with a median size of $130 million. (All figures in Canadian dollars.)

12 Data on quarterly sales, leverage, tangible assets, market-to-book values and the profitability of public firms, all of which are known to affect rate spreads, are from Compustat. Bank-level information, such as assets, deposit-to-asset ratios, capital ratios and bank profitability, is from data collected by the Office of the Superintendent of Financial Institutions Canada.

13 In one part of the analysis, the authors examine only those firms that take multiple loans from the same bank over different monetary policy environments. This analysis of risk taking for the same pool of borrowers over different monetary policy environments is important because it has been shown that, depending on the macroeconomic environment, the pool of borrowers may change substantially and affect the overall price and quantity of credit.

interest rate environment in three different ways: (i) if the overnight target (policy) rate is lower than a certain benchmark such as the median interest rate over a sample period; (ii) if the policy rate is lower than the rate in the previous announcement date;[14] and (iii) if the policy rate is lower than the rate predicted by the Taylor rule.

The results suggest that the difference in the all-in-drawn spreads between loans to risky and less-risky borrowers decreases when interest rates are low relative to periods when they are high. Accounting for loan, firm and bank balance-sheet factors, as well as yearly and quarterly factors, the results show that the difference in the all-in-drawn spread between risky and less-risky borrowers is 48 per cent smaller when interest rates are lower than when they are higher (based on the first definition). This result is also economically significant: it implies that the difference in loan rates between risky and less-risky borrowers is 107 basis points smaller when the rates are low than when they are high.

This study is subject to several caveats. The main one is that a bank's risk tolerance is unobservable. Hence, drawing conclusions about the bank risk-taking channel based on the effects on loan prices of changes to the balance sheets of both banks and firms should, at best, be interpreted as evidence that is consistent with (or suggestive of) the existence of the risk-taking channel. It is possible that loan rates are subject to demand and supply effects that are not directly related to the risk-taking channel and are not fully controlled for by other variables included in the model. One way to address this issue is to measure the risk appetite of banks using qualitative information gathered from survey questions that ask banks whether they have become more risk tolerant in a particular period. Unfortunately, such detailed bank-specific information based on survey data is not available for Canada.[15]

This empirical exercise for the Canadian syndicated loan market nevertheless confirms, in accordance with international evidence from Europe, South America and the United States, that a greater appetite for risk may be a contributing factor to the observation that bank loans to risky borrowers become relatively cheaper when interest rates remain low for a prolonged period. This behaviour seems to exist across countries with different economic and institutional environments. These findings can be viewed as a first step toward a more detailed exploration of how and whether changes in the sizes and rates of loans resulting from an increased appetite for risk affect the real economy.

◂ *A greater appetite for risk may be a contributing factor to the observation that bank loans to risky borrowers become relatively cheaper when interest rates remain low for a prolonged period*

Conclusion

The possibility that a low interest rate environment (and low volatility) for a prolonged period of time was one of several factors that contributed to the recent financial crisis has led to an ongoing debate among policy-makers, practitioners and academics on the effects of monetary policy on the risk-taking incentives of economic agents.

14 The authors find that, according to the first definition, 39 per cent of all loan facilities are originated in a low interest rate environment and that, according to the second definition, 47 per cent of all loans are originated in a low interest rate environment. Under both definitions, there are prolonged periods in which rates remain low (defined either relative to the median, as in definition (i), or relative to the previous period, as in definition (ii)) and it is not possible for rates to be low for one quarter and high in the next quarter. The shortest time span in the sample in which rates are low is four consecutive quarters.

15 The Bank of Canada's *Senior Loan Officer Survey* collects information on the business-lending practices of Canadian financial institutions. In particular, the survey gathers the perspectives of respondents on price and non-price terms of business lending and on topical issues of interest to the Bank of Canada. It does not provide disaggregated results at the bank level.

An improved understanding of the risk-taking channel of the monetary policy transmission mechanism is needed for the following reasons. First, it may have an amplifying effect in the balance-sheet channel and the bank-lending channel, which needs to be accounted for in order to evaluate the effect of accommodative monetary policy. Second, prolonged periods of low interest rates, unless coupled with adequate prudential regulation at both the micro and macro levels, can contribute to softer bank lending policies and/or the buildup of financial imbalances resulting from a greater appetite for risk. Central banks have endorsed enhanced supervision of risk-taking activities at the institutional level and the development of macroprudential measures as main lines of defence against the buildup of such financial imbalances.

Finding evidence of an increase in appetite for risk based on the change in spreads and amounts of loans to risky and less-risky borrowers is a challenging empirical task, because these changes may be derived from factors other than risk appetite. Thus, research results in which risk appetite is inferred based on changes in the price and amount of credit have to be interpreted with caution. Research has nevertheless made progress in this area by documenting that this channel can operate in the commercial loan markets in several countries, including Canada. It is worth noting that none of the studies discussed asserts that risk taking is excessive, since they do not rely on an optimal risk-taking benchmark to gauge the extent of excessiveness. Rather, these studies offer empirical evidence that is consistent with elevated risk-taking behaviour in lending policies when interest rates remain low for a prolonged period of time.

To further understand the aggregate economic impact of this channel, it is important to examine whether a greater risk appetite in response to low interest rates is present outside the banking sector. Insurance companies, pension funds and mutual funds may also exhibit an increased appetite for risk when interest rates are low. Further research is needed to determine whether different economic agents are inclined to have a stronger appetite for risk when rates remain low for a prolonged period.

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The Changing Landscape for Retail Payments in Canada and the Implications for the Demand for Cash

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- The share of cash in overall retail payments has decreased continuously over the past 20 years.
- Recent Bank of Canada research on consumers' choice of payment instruments indicates that cash is frequently used for transactions with low values because of its speed, ease of use and wide acceptance, while debit and credit cards are more commonly used for transactions with higher values because of perceived attributes such as safety and record keeping.
- While innovations in retail payments currently being introduced into the Canadian marketplace could lead to a further reduction in the use of cash over the longer term, the implications for the use of cash of some of the structural and regulatory developments under way are less clear.
- The Bank of Canada will continue to monitor various developments in retail payments and study their implications for the demand for cash over the longer term.

The past 20 years have seen significant changes to the way Canadians pay for their purchases at the point of sale (POS). In particular, there has been a major shift away from paper-based payment instruments, such as cash and cheques, toward electronic means of payment, such as debit cards and credit cards. Major technological, structural and regulatory developments that are currently under way may significantly affect future methods of payment in this country, and elsewhere.

To better understand the potential implications of these developments for retail payments, the Bank of Canada commissioned the 2009 Methods-of-Payment (MOP) survey, which asked respondents to keep a detailed diary of personal purchases of goods and services over a three-day period. The Bank, as the sole provider of bank notes, needs to carefully assess the implications for the future demand for cash of prospective changes in the use of various retail payment instruments.

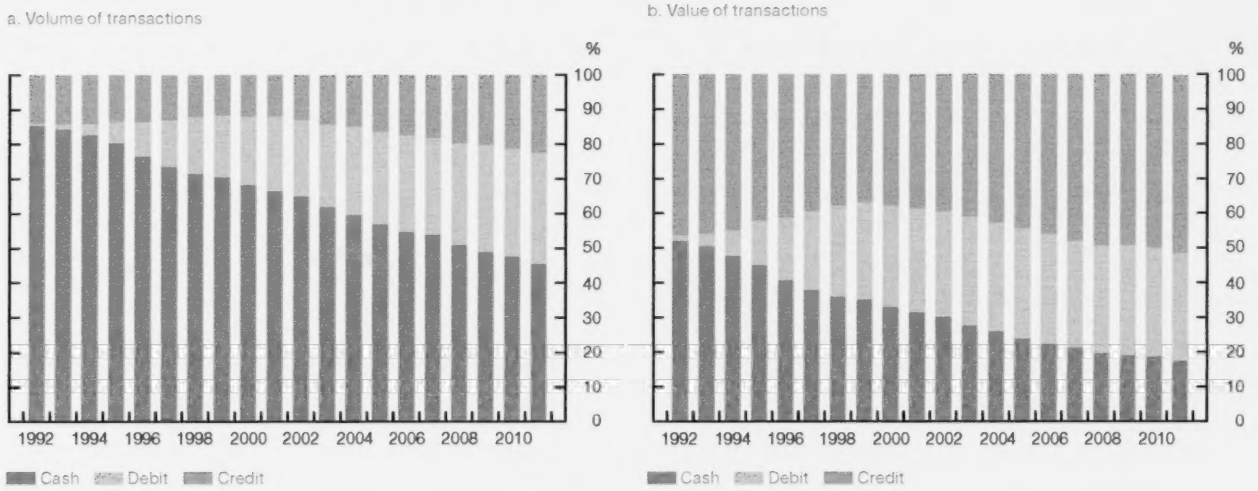
This article begins by reviewing trends in the use of retail payment instruments in Canada and by presenting insights from the Bank's research using the 2009 MOP survey. It then discusses the most important innovations in retail payments in recent years and provides a brief review of structural and regulatory developments in retail payments. Finally, the article provides some concluding remarks.

Trends in the Use of Retail Payment Instruments

In the early 1990s, cash accounted for more than 80 per cent of the volume and about 50 per cent of the value of POS transactions (**Chart 1**).[1] In 2011, however, these shares dropped to below 50 per cent in volume and less than 20 per cent in value. In contrast, the share of electronic-based payments (debit and credit cards) has grown. In particular, following the national introduction of the Interac debit card system in 1994, the debit card share of POS purchases (in terms of volume) surged upward until the early 2000s. The share of credit card payments has risen since the early 2000s, in part, owing to the increasing number of rewards programs connected to credit card use.

◀ *In 2011, the shares of cash in point-of-sale transactions dropped to below 50 per cent in volume and less than 20 per cent in value*

Chart 1: Shares of point-of-sale transactions, by payment method



Note: Volume denotes the number of transactions, while value is the total dollar amount of the transactions. The statistics are computed from network data.
Sources: Bank for International Settlements Red Book and Bank of Canada
Last observation: 2011

Despite the decreasing share of cash at the POS, it remains the most commonly used and accepted form of retail payment in Canada, especially for the large number of low-value purchases. In 2011, the total value of cash transactions was estimated at just over $100 billion, with an average transaction value of $18. In contrast, debit and credit cards are used mainly for less-frequent, higher-value transactions. In 2011, the value of POS transactions for debit cards reached $180 billion, with an average transaction value of $44, while the total value for credit card transactions was more than $300 billion, with an average transaction value of just over $100.

◀ *Cash remains the most commonly used and accepted form of retail payment in Canada, especially for the large number of low-value purchases*

Another factor that has marginally reduced the use of cash in recent years is the increasing use of the Internet by Canadian households to purchase goods and services. In 2010, 89 per cent of Canadians used credit cards to pay for online purchases (Statistics Canada 2011b).

Canadians also use cash for purposes other than as a means of payment. For example, individuals hold bank notes as a store of value and for precautionary purposes. Indeed, the value of bank notes in circulation has risen at an annual rate of about 5 per cent since 2000, virtually the same

1 Since explicit time-series data on both the volume and the value of cash-based retail transactions are not available, indirect estimation methods must be employed, using data on withdrawals from automatic teller machines. For a more detailed discussion, see Taylor (2006).

as the growth in aggregate personal expenditures. Moreover, the ratio of the stock of large-denomination bank notes to overall consumer spending has risen since the 2007–09 global financial crisis. It would appear that the use of cash for non-payment purposes has grown markedly since 2000, even though the share of cash-based retail transactions has continued to decline.[2]

How Canadians Pay: The 2009 Methods-of-Payment Survey

To anticipate future trends and developments in retail payments, it is important to understand how Canadians use different payment methods for retail purchases. The Bank of Canada conducted the 2009 Methods-of-Payment (MOP) survey using a representative sample of Canadians ranging in age from 18 to 75. There were two parts to the survey: a survey questionnaire and a shopping diary, in which respondents recorded every retail transaction they performed over three consecutive days. The questionnaire collected detailed information on demographics (income, age and education), bank (debit) and credit account features (per-transaction fees, monthly and annual fees, reward plans, and credit limits), and consumer perceptions regarding the attributes of payment instruments (ease of use, record keeping, budgeting control and security). The diaries collected detailed information on transactions, such as value, type of good, store size, payment methods perceived as accepted and the two main reasons for choosing the payment method used.[3]

According to the MOP survey, almost all of those surveyed had a debit card and 80 per cent of them owned at least one credit card. The shares of POS transactions in terms of both value and volume from the shopping diaries echo the findings shown in **Chart 1**: cash is the dominant payment choice for transaction volumes, while credit cards dominate in terms of value. Participants also used cheques and stored-value cards, although these accounted for less than 4 per cent of everyday purchases. Hence, the discussion that follows focuses on cash, debit cards and credit cards.

Previous literature has highlighted a strong relationship between payment choice, transaction value and demographics (see Bounie and François (2006) for France, and Klee (2008) for the United States). However, the detailed information gathered by the MOP survey allowed researchers to go beyond demographics and transaction values to get a better understanding of payment choices.

Arango, Huynh and Sabetti (2011) and Arango, Hogg and Lee (2012) both use the 2009 MOP survey data to estimate a model that accounts for the effects of the demographic characteristics of consumers, payment attributes, transaction features and perceptions of merchant acceptance on the probability of using cash versus debit cards and credit cards at the POS. The observed differences highlight the costs and benefits associated with different payment instruments that vary by type of consumer and transaction.

2 Cash may also be used for transactions in the underground economy, such as the unauthorized sale of alcohol and tobacco, or unreported construction activity. However, Statistics Canada estimates that the underground economy has been growing at a slower pace than the total economy since 1992, suggesting that this factor may not explain why the value of bank notes in circulation has risen at about the same rate as total personal consumption over the past decade (Terefe, Barber-Dueck and Lamontagne 2011).

3 The survey was conducted by a market research firm using stratified random sampling from access panels (i.e., databases of people who have signed up to participate in surveys on a regular basis). There were 6,868 respondents to the questionnaire, while 3,405 three-day diaries were collected on more than 16,000 transactions. Sample weights were constructed to match the demographic profile of Statistics Canada's Canadian Internet Use Survey. For a more detailed description and the main results of the 2009 MOP survey, see Arango and Welte (2012).

This research shows that demographic variables such as income and age are key factors in the choice of payment instrument. Demographics are also correlated with consumers' perceptions of alternative payment methods regarding costs, risks and record keeping.[4] **Table 1** shows that low-income individuals use cash most frequently, with 65 per cent of their transactions in the diaries paid with cash. They perceive that cash is easy to use, is useful for controlling spending and has lower costs relative to payment cards. High-income earners, however, use cash least frequently, with only 47 per cent of their transactions paid with cash. These high-income earners do not perceive cash as a good way to control spending or as having lower costs. In addition, they are more likely to own a credit card and to have one with rewards.

Demographic variables such as income and age are key factors in the choice of payment instrument

Table 1: **Perceptions ratings of cash relative to debit cards and credit cards**

		Payment attributes**					
	Proportion of cash transactions*	Ease of use	Record keeping	Costs	Risk of theft or fraud	Minimize financial loss	Acceptance
Age							
18–34	48.9	1.18	1.00	1.00	0.86	1.05	1.12
35–54	53.9	0.97	0.99	1.06	0.97	0.99	0.99
55–75	59.0	0.84	1.02	0.92	1.21	0.96	0.87
Income (in thousands of dollars)							
Less than 30	65.2	1.33	1.16	1.11	0.88	0.87	0.95
30–60	56.5	0.76	1.04	1.09	1.13	0.98	0.90
60–100	52.8	0.95	0.98	1.02	0.96	1.01	1.00
More than 100	47.4	1.11	0.89	0.84	0.98	1.08	1.13
Gender							
Female	54.1	0.84	1.00	1.07	0.94	0.95	0.99
Male	54.3	1.18	1.00	0.93	1.07	1.05	1.01
Residence location							
Urban	53.9	0.96	0.99	1.00	1.01	1.00	1.03
Rural	55.2	1.13	1.04	1.00	0.98	0.99	0.91
Responsible for household finances							
No	53.6	1.11	1.03	0.96	1.07	1.02	1.05
Yes	54.6	0.93	0.98	1.02	0.95	0.99	0.97

Notes: This table reports the proportion of cash usage and perceptions of cash relative to payment cards (debit and credit cards) for various demographic profiles. A rating of 1.00 indicates that the average consumer's perception of an attribute is neutral with respect to cash versus payment cards. A rating greater than 1.00 implies a relatively positive perception of cash, while a rating less than 1.00 indicates a relatively negative perception of cash. The sources for the calculations are the 2009 three-day shopping diaries (*) and the survey questionnaire (**).

Source: Bank of Canada 2009 Methods-of-Payment survey

Another important factor for payment choice is the relationship between transaction value and various payment card features. Research at the Bank confirms that cash is used mostly for lower-value transactions (less than $25) (Arango, Huynh and Sabetti 2011; Arango, Hogg and Lee 2012). However, Arango, Huynh and Sabetti (2011) find that, for transactions with medium values ($25 to $50), consumers tend to trade the speed and ease of paying with cash for the other attributes offered by debit cards. Debit cards

Another important factor for payment choice is the relationship between transaction value and various payment card features

4 The question about record keeping is phrased as follows: ". . . how useful are (or would be) the following methods of payment in terms of helping you to keep a record of your spending?"

are more likely to be used instead of cash and credit cards in order to avoid theft and fraud, since they require verification with a personal identification number (PIN).[5] Also, debit card use is highest for about half of the consumers in the survey who have bank accounts with no monthly fees and a large or unlimited number of free debit transactions.

Credit cards dominate other payment instruments for transactions with higher values (above $50), and most of the substitution is from debit cards rather than cash. Arango, Huynh and Sabetti (2011) find a positive relationship between credit card use and rewards. Since most rewards are proportional to the payment value, consumers have the monetary incentive to use credit cards for higher-value transactions. In addition, credit cards allow users to delay payment, which, consumers reported, becomes more attractive at higher transaction values.

To better understand why cash is the dominant payment choice for low-value transactions, it is useful to examine consumer perceptions about the acceptance of payment cards. Arango, Huynh and Sabetti (2011) and Arango, Hogg and Lee (2012) explore to what extent perceived lack of acceptance of debit and credit cards explains consumers' preference for cash for low-value transactions. In the diaries, survey participants were asked to report which payment methods they thought would not be accepted, based on the transaction value. In some cases, consumers perceive that cards are more readily accepted when the transaction value is higher and the merchant is large.[6] However, even at stores where debit and credit cards are perceived as accepted, cash still accounts for half of the transactions below $25. This result is confirmed by Wakamori and Welte (2012), who simulate the scenario of universal acceptance of all methods of payment, and find that the decrease in the use of cash in this scenario is relatively small.

Major Innovations in Retail Payments

Recent and future innovations in retail POS and online payments have the potential to reshape the payments landscape.[7] Many of the key innovations in retail payments introduced in Canada are intended for lower-value transactions and therefore focus on the speed and convenience of transactions. In comparison with cash, these payment instruments have the added advantage of the capability to keep a record of transactions.

◀ *Many of the key innovations in retail payments are intended for lower-value transactions and therefore focus on the speed and convenience of transactions*

One major development is the rollout in Canada of "chip" debit and credit cards, which are replacing cards with magnetic stripes. This rollout has been under way since 2008 and is scheduled to be completed by the end of 2015.[8] Chip cards contain an embedded microchip that gives the card the ability to store and process data. This technology is primarily intended to enhance the security of the card and associated payment transactions, so that the use of these cards might increase.

Payment card products with a contactless feature using near field communication (NFC) technology, which allows consumers to wave the card in front of a secure payment terminal instead of inserting or swiping it, are designed

5 This result is based on data collected in 2009, when credit cards with a magnetic stripe and requiring a signature were the norm. It may no longer hold now that credit cards embedded with a microchip and requiring a PIN are common in Canada.

6 This finding is consistent with Arango and Taylor (2008), who find that cash is the least expensive payment method for merchants, especially for those who have high volumes of low-value transactions.

7 The Committee on Payment and Settlement Systems provides an overview of innovative retail payment activities in a number of countries (CPSS 2012).

8 The use of chip payment cards is common in many countries.

to mimic some of the characteristics of cash, such as shorter transaction times and enhanced convenience. While contactless credit cards have been available in Canada for several years, their acceptance across a wide range of merchants has been fairly slow. Indeed, the shares of contactless credit card payments in the overall volume and value of consumer purchases in 2011 were only 2.4 per cent and 2.7 per cent, respectively.[9] In addition, Interac debit cards with a contactless payment feature ("Flash") have been available since the autumn of 2011. Given the recent introduction of this payment product, no data on its use are publicly available yet.[10]

A number of developments could promote the successful adoption of contactless NFC payments. First, the replacement of conventional debit and credit cards by those with a contactless feature is well under way. Second, more retailers are starting to accept such payments as card processors roll out rental terminals enabled with contactless technology.[11] Finally, card issuers may start competing in this market by offering incentives to promote contactless payments. Using data from the 2009 MOP survey, Fung, Huynh and Sabetti (2012) show that the adoption and use of contactless cards could result in a drop of about 10 per cent to 14 per cent in the use of cash (depending on the volume or value of transactions).

Multi-purpose prepaid cards that are reloadable, offered by Visa and MasterCard, have been available in Canada for several years and are typically accepted wherever these credit cards are accepted. Consumers do not require a bank account to access this payment product, which can be used abroad, online and to withdraw cash from automatic teller machines, as well as at the POS. Owing to the high fees charged to cardholders, use of these cards is not widespread, accounting for approximately 1 per cent of the overall value of consumer purchases in 2011, according to the *Canadian Financial Monitor*.[12]

Two online innovations have been introduced as part of the Interac system. Interac Online is an approach for making online debit payments, while Interac e-Transfer allows for the transfer of funds through online banking.

Canada has also seen the entry of new business models for Internet-based payments, such as PayPal and Zoompass, which are non-bank systems offering prepaid accounts and person-to-person transfer services using a mobile phone or any device with access to the Internet.[13] Some of these systems also allow consumers to make payments to either a merchant or another person using the mobile device's wireless Short Message Service (SMS), voice or Internet capabilities.

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9 These shares are calculated using data from the *Canadian Financial Monitor*, which is an omnibus survey conducted by Ipsos Reid that samples approximately 12,000 households each year, providing comprehensive information about their finances and their use of cash and alternative methods of payment.

10 The introduction of contactless debit cards was facilitated by the development in 2009 by the Canadian Payments Association of a policy framework and new rule for POS debit payment cards that do not require a PIN.

11 According to MasterCard, PayPass transactions now account for almost 10 per cent of its total credit card transactions in Canada (Sevilla 2012).

12 In October 2012, the federal government announced that it was extending the existing consumer-protection framework to prepaid payment products, in particular, those issued by federally regulated financial institutions (Department of Finance Canada 2012b).

13 Zoompass is operated by EnStream LP, which is a joint venture of the three major mobile carriers in Canada—Bell, Rogers and TELUS. However, it was recently announced that Paymobile, a provider of program-management services for prepaid and virtual card programs, is acquiring the Zoompass payment service. Users can send funds from their Zoompass account to another Zoompass account for free, or through a linked credit card for a fee.

Mobile phones can also be used for POS purchases using NFC technology, in which an NFC chip, either built into the device or attached with a sticker, would communicate with the payment terminal. Relatively few products are currently available, although, in September 2011, the Bank of Montreal introduced a sticker product that can be attached to a mobile phone. In May 2012, the Canadian Imperial Bank of Commerce and Rogers Communications announced a partnership for a mobile payment solution that is expected to be available before the end of 2012. Internationally, work is under way on a number of different projects to develop mobile wallet capabilities, whereby various payment and other functions (such as retailer-specific rewards programs) would be included on a mobile phone.

These Internet-based and mobile payments have the potential for considerable growth. As the number of Canadians using the Internet and making online purchases increases, there will be a need for more payment options, which, in turn, should promote further growth in e-commerce.[14] In addition, the increasing popularity of mobile phones, particularly smartphones,[15] indicates that Canada is ready for mobile payments.[16]

While cash continues to be the most frequently used payment instrument for POS and person-to-person payments in developed countries, including Canada, the growth of Internet-based and mobile payments may have a significant impact on the use of cash if consumers shift from POS transactions to online purchases and send funds through their mobile phones or the Internet. To better understand this development and its impact, more research is required.

Structural and Regulatory Developments

In recent years, many merchant groups in Canada have expressed strong concerns about sharp increases in the fees charged to merchants for accepting credit cards, as well as the lack of transparency concerning the magnitude of these fees (Retail Council of Canada 2009; 2012). It has been suggested that merchants have inadequate bargaining power in dealing with the payment processors that facilitate credit card transactions (Standing Senate Committee on Banking, Trade and Commerce 2009).

Such concerns were addressed during the discussion and final rejection by the Competition Bureau, in February 2010, of Interac's application to become a for-profit organization in order to compete more effectively with Visa and MasterCard following their planned entry into the debit card payment market in Canada (Competition Bureau 2010a).

Furthermore, in response to concerns about the degree of competition in the debit and credit card industry and the issues raised by merchants, the federal government implemented a Code of Conduct for the Credit and Debit Card Industry in Canada (Code of Conduct), which went into effect on 16 August 2010 (Department of Finance Canada 2010). Among its provisions, the Code of Conduct allows merchants to provide discounts for specific payment methods and payment products offered by different card networks.

14 According to the 2010 Canadian Internet Use Survey, 80 per cent of Canadians aged 16 years and above used the Internet for personal use and 51 per cent of them shopped online. These numbers have increased considerably since 2005.

15 According to Statistics Canada, 78 per cent of Canadian households indicated that they had a cellular phone in 2010 (Statistics Canada 2011a). A recent market study estimates that, in December 2011, 45 per cent of mobile phone users in Canada used a smartphone (eMarketer 2012).

16 In the recent MasterCard Mobile Payments Readiness Index, which collects and compares the adoption rate of mobile payments across 34 countries worldwide, Canada ranked second with a score of 42, behind only Singapore with a score of 45.6. The average score was 33.2 out of a maximum of 100. See <http://mobilereadiness.mastercard.com/the-index/noflash.php>.

The Code of Conduct also stipulates that: (i) debit and credit functions must be featured on separate cards; (ii) competing debit card applications must not be offered on the same card; and (iii) merchants are not obliged to accept both the debit cards and the credit cards from a particular payment card company. These provisions have maintained the dominant position of Interac in the domestic debit card market at the POS, while allowing other payment card companies to provide debit card payments for purchases online, by mail, over the phone or internationally.

In December 2010, the Commissioner of Competition issued a complaint against both Visa Canada and MasterCard International regarding their merchant restraint rules (Competition Bureau 2010b). These rules forbid merchants that accept the credit cards of either of these companies to undertake any of the following actions: discriminating against the use of high-cost credit cards in favour of lower-cost methods of payment, applying a surcharge on purchases by customers paying with a particular type of credit card or refusing to accept particular cards within a credit card brand. The Commissioner of Competition has asked the Competition Tribunal to prohibit both of these credit card companies from imposing these restraints or any similar measures. Such prohibitions, if granted, could significantly reduce the incentive for consumers to use these cards. Hearings by the Competition Tribunal on this request took place in mid-2012.

In June 2010, the government appointed the Task Force for the Payments System Review to provide recommendations to the federal Minister of Finance on how to guide the evolution of the payments system in Canada. In its final report, released by the Department of Finance on 23 March 2012, the Task Force suggested that Canada is falling behind in the modernization of its payments system. One of the most important recommendations of the Task Force was the suggestion that the federal government should partner with the private sector to create a mobile-commerce environment for consumers (Task Force for the Payments System Review 2012). In response, in September 2012, the federal government proposed amendments to the Code of Conduct to ensure that its principles are upheld for mobile payments initiated by consumers at the POS (Department of Finance Canada 2012a). Also, in May 2012, the banking industry and credit union system in Canada announced a set of voluntary guidelines for participants in the mobile-payments marketplace to ensure safety, security and ease of use at the POS for both merchants and consumers. These guidelines are designed to work with the existing contactless payment technology already in place and could facilitate innovations in mobile payments.

Some of these regulatory developments, such as allowing merchants to add a surcharge on the use of certain high-cost credit cards or even refuse to accept them, might reduce the use of credit cards. Meanwhile, collaboration among key players and regulatory changes to help facilitate innovations in mobile payments might promote the use of mobile phones for retail payments and possibly reduce the use of cash. The overall impact of these structural and regulatory developments on the mix of electronic and paper-based retail transactions over the longer term remains to be seen.

◀ *The overall impact of structural and regulatory developments on the mix of electronic and paper-based retail transactions over the longer term remains to be seen*

Conclusion

This article has provided evidence that cash is still used extensively by consumers to pay for their purchases, particularly for low-value transactions. However, recent and future developments in payment technologies could have a variety of effects on the use of cash and other retail payment instruments. It will be important for the Bank, as the sole supplier of bank notes, to monitor these developments and study their possible effects on the payment decisions of both consumers and merchants.

Research could also address the issue of the diffusion of payment innovations, which is an inherently complex problem. Merchants will accept payment innovations only if they believe that consumers demand them; likewise, consumers will demand payment innovations only if they are accepted by merchants. This feedback effect will require further study of the decisions of both consumers and merchants (Rysman 2009; Crowe, Rysman and Stavins 2010).

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